



# UNIVERSITY OF CALIFORNIA.

## AGRICULTURAL EXPERIMENT STATION.

BERKELEY, CAL.

E. W. HILGARD, *Director.*

BULLETIN NO. 85.

### OBSERVATIONS ON OLIVE VARIETIES.

The increasing prominence of olive culture in this State gives importance to all light that can be thrown upon the subject, the more as the slow growth of the tree renders mistakes made in the selection of varieties both costly and difficult of rectification. It is therefore the intention of the Station to subject both the growing trees and the fruit and its products to the most thorough comparative observation and investigation, as quickly as the material shall be obtainable. In the meantime, the observations of Mr. Klee, recorded below, appear of sufficient practical importance to justify their publication at this time.

It is evident that both with respect to the production of oil and that of pickled olives, the proportion of kernel to meat is a matter of no mean importance, when we see, as is shown <sup>below</sup>, that this proportion varies all the way from 8 to over 34 per cent. Some have the impression that the oil of the kernel or pit forms a considerable proportion of the product, but the investigation of this point made by Mr. L. Paparelli upon the common olive of Central Italy, showed this proportion to be as one to 30; while in the Mission olive, noted for the rarity of sound kernels, the proportion was found by Mr. Ad. Sommer of the University, as one to 162. Hence to the oil-maker as well as to the consumer of pickled fruit, the data given will be of some interest.

E. W. HILGARD.

OBSERVATIONS BY W. G. KLEE.

The following records and table show the growth of a number of varieties of olives, as

the result of several years' observations, and it is hoped will add to our knowledge of some of the numerous varieties now cultivated in this State. This is, of course, only the beginning of observations which will be continued for years to come. Nearly all the varieties enumerated are now growing at the four different Experiment Stations, viz.: Berkeley, Paso Robles, Jackson and Tulare; and we shall thus have a good opportunity to test their respective value in these four distinct sections. Those at Berkeley were planted five years ago; while those at the other stations were set out only a year ago, and thus afford but few data of value.

The observations of the varieties growing on the grounds of the California Nursery Co., Niles, and at Fancher Creek Nursery, Fresno, I have personally had the opportunity to make, through the courtesy of their respective managers, Mr. John Rock, and G. C. Roeding, who, as well as Mr. Juan Gallegos of Mission San Jose, kindly allowed me to take specimens for identification.

In the text following the table only a description of the fruit is given, since the foliage varies so much as between old and young trees as to make it difficult of use as a distinctive mark.

In "Series I" the varieties are arranged in accordance with the proportion of the pit to the pulp, by bulk, as shown in the last column of the small table preceding their discussion. The measurements given represent, of course, the average of a greater or less number made on normal fruit. We can thus obtain a fair idea of the actual bulk of pulp contained in a gallon of the fruit. This, it is true, is only one of the factors that determine the value of the olive. The actual yield of oil, and the quality of the latter, remain to be determined hereafter; but the table, as it is, will serve for purposes of investigation, and is certainly of practical interest.



# TABULATED STATEMENT OF GROWTH AND BEARING OF VARIOUS OLIVE VARIETIES IN BERKELEY AND OBSERVATIONS IN OTHER LOCALITIES.

NAME & AGE WHEN PLANTED.	CUTTINGS OR GRAFT'D TREES	DIAMETER OF STEM.	DIAMETER OF CROWN.	HEIGHT	OBSERVATIONS OF HABIT OF GROWTH AND BEARING IN BERKELEY.	OBSERVATIONS IN OTHER LOCALITIES.
<i>Regalis</i> — April, 1885, 2 years old.	Grafted on Redding Picholine.	1 in.	Very small	5 ft.	This specimen is in a rather unfavorable spot; growth poor.	Bearing well at Niles as well as in Fresno.
<i>Polymorpha</i> — April, 1885, 2 years old.	Grafted on Redding Picholine.	1 in.	.....	.....	Slow grower here, no sign of fruit yet.	Bearing fairly well at Niles; at Fresno, little fruit yet.
<i>Macrocarpa</i> — April, 1885, 2-yr old tree.	Grafted on Redding Picholine.	.....	.....	.....	Seemingly a good grower, no sign of fruiting yet.	At Niles, bearing fairly well; at Fresno, a tree stunted by close pruning has very large fruit.
<i>Columbella</i> — April, 1885, 2-yr old tree.	Grafted on Redding Picholine.	Very small. Not measured.			Lacks vigor, in this instance most likely due to poor union of graft.	Bearing well both at Niles and Fresno.
<i>Nevadillo blanco</i> — April, 1885, 1 year old.	Small rooted Cuttings.	No. 1-3 in. No. 2-2 $\frac{3}{4}$ in. No. 3-2 $\frac{1}{2}$ in. No. 4-2 $\frac{1}{2}$ in. No. 5-2 in. No. 6-1 $\frac{1}{2}$ in. No. 7-1 $\frac{1}{2}$ in. No. 8-2 $\frac{1}{2}$ in.	9 ft. 8-9 ft. 8 ft. 7 ft. 7 ft. 8 ft. 7 ft. 7 ft.	10 ft. 9 ft. 9 ft. 9 ft. 8 ft. 8 ft. 8 ft. 9 ft.	A very strong grower, light silvery foliage, drooping habit, has not bloomed yet.	One small tree bearing well at Niles; at Mission San Jose a number of trees bearing well; also at Fresno. Seemed more tender than some others, and suffered from frost at Experiment Station, Jackson, in Jan., 1893.
<i>Manzanillo</i> No. 2 (true). April, 1885, 1 year old.  April, 1886.	Small rooted Cuttings.  6 cuttings made from pieces of truncheons average.....	No. 1-1 $\frac{1}{2}$ in. No. 2-1 $\frac{1}{2}$ in.	..... 5 ft.	6 ft. 6 ft.	Upright moderate grower, sparse foliage, shows tendency to be straggling. Several trees showed blossoms last spring, none set yet.	4-year-old tree bearing a few fruits at Niles; at Fresno, trees from the imported truncheons are bearing well; fruit large. Seem very hardy as regards frost.
<i>Pendulina</i> — April, 1885, 2 years old.	Grafted on Redding Picholine.	No. 1-1 $\frac{1}{2}$ in. No. 2-2 in.	..... 7 ft.	6 ft. 8 ft.	Strong grower with decidedly drooping habit; bloomed considerably but set only a few fruits.	Shows tendency to coulure but bears well nevertheless at Niles; at Fresno the setting was poor, owing to coulure.
<i>Oblonga</i> — (Rocks)	.....	.....	.....	.....	.....	Moderate grower; bearing early and well; noticed at Niles, at Auburn, at Saratoga, Santa Clara Co., and at Fresno.
<i>Rubra</i> — April, 1885, 2 years old.	Grafted on Redding Picholine.	1 $\frac{1}{2}$ in.	5 ft.	6 ft.	Showed blossoms last year but did not set; this specimen is affected by neighboring trees.	A fair upright grower; bears early and abundantly. Observed at San Jose, Niles, Fresno and Riverside, San Bernardino Co.
<i>Præcox</i> — 2-year-old tree, 1885.	Grafted on Redding Picholine.	1 $\frac{1}{2}$ in.	5 ft.	6 ft.	Fair grower, showed blossoms this year but did not set.	Bearing well both at Fresno and Niles.
<i>Atrorubens</i> — April, 1885, 2 years old.	Grafted on Redding.	Very poor specimen, probably due to imperfect union of the graft.			.....	At Niles, coulure seemed to be the cause of poor setting.
<i>Uvaria</i> — April, 1885, 2 years old.	Grafted on Redding Picholine.	Original specimen died; was replaced last year.			.....	Bears very abundantly both at Niles and at Fresno.
<i>Atrorivaleacea</i> — April, 1885, Fair grower.	Grafted on Redding Picholine.	1 $\frac{1}{2}$ in.	6 ft.	7 ft.	Fair grower; no sign of fruiting this year.	Bearing well at Niles. At Fresno, fair yield.
"Redding Picholine"— April, 1885, 1 year old.	Small rooted Cuttings.	No. 1-2 $\frac{1}{2}$ in. No. 2-2 $\frac{1}{2}$ in. No. 3-1-4-5 in. No. 4-2 $\frac{1}{2}$ in. No. 5-1 $\frac{1}{2}$ in. No. 6-2 $\frac{1}{2}$ in.	8 ft. 7 ft. 7 ft. 6 ft. 5 ft. 6 ft.	9 ft. 8 ft. 7 ft. 7 ft. 6 $\frac{1}{2}$ ft. 7 ft.	Fair upright grower; some trees blossomed considerably, but nearly all dropped off.	Bearing well at Niles and at Fresno as well as in any part of the State.
<i>Razzo</i> — April, 1888.	Small rooted Cutting.	.....	.....	4-5 ft.	A thrifty grower.	.....
<i>Corregiole</i> — April, 1888, 3 years old.	Small rooted Cuttings.	.....	.....	5 ft.	A thrifty grower.	.....

NOTE.—Observations at Fresno refer to Fancher Creek Nursery, Fresno. Observations for Niles refer to 1. Nursery Co.'s grounds, Niles.



OLIVE VARIETIES RANKED ACCORDING TO PER CENT OF PIT.

Variety of Olive.	Dimensions of Fruit in 16ths of an Inch.				Pit Percent by Bulk.
	Whole Fruit.		Pit.		
	Length.	Width.	Length.	Width.	
Regalis.....	17	13	9	5	7.8
Manzanillo No. 1.....	16	13	9	5	8.3
Nevadillo Blanco.....	16	10	10	4	10.0
Pendulina.....	12	9	7	4	11.5
Columella.....	14	11	8	5	11.8
Mission.....	16	10	10	5	15.6
Polymorpha.....	19	12	12	6	15.8
Rubra.....	12	8	8	4	16.7
Rock's Oblonga.....	15	8	11	4	18.3
Mignolo*.....	9	7	8	4	29.0
Adding Picholine.....	8	6	6	4	33.3
Varia.....	13	9	10	6	34.2

\*Measurements taken from *Caruso's* cut of this variety for sake of comparison.

#### SERIES I.

*Regalis*.—Imported by John Rock from France. Almost perfectly rounded—oval; when ripe, dark purple or black; large, 1 1-16 inches long, by 13-16 in thickness; flesh, firm; pit 9-16 of an inch by 5-16 of an inch, generally straight, square at the base, pointed at the apex. Ripens slightly ahead of the broad-leaved Mission variety.

*Manzanillo No. 1*.—Imported by F. Pohndorf from Spain, and grown by Juan Gallegos, Esq., at Mission San Jose; large, 1 inch long by 13-16 in thickness; regular rounded oval; pit, straight, strongly pointed at the apex, 9-16 of an inch long, 5-16 of an inch thick. Ripens early, several weeks earlier than the broad-leaved Mission. In many respects this resembles the *Sevillano Gordal* or Queen olive of Spain, more than any variety I have examined in this State. The fruit grows on long stems, and in a windy place would be liable to fall. The pulp parts readily with the bitterness, and is exceedingly rich when pickled.

*Polymorpha*.—Imported by John Rock from France; very large, ovate, oblique and pointed; 13-16 inches long by 12-16 of an inch thick; pit 12-16 of an inch by 6-16 in thickness, square at the base, strongly pointed at the apex; flesh firm. Time of ripening falls much like the broad-leaved Mission; fruit grows on strong <sup>fresh</sup> *reses* in clusters of two or three.

*Lacrocampa*, very much like above; we have not had specimens enough to make out a distinction.

*Columbella*.—Imported by John Rock from France. General form, broadly oval, 14-16 of an inch long and 11-16 of an inch thick; very even in size, remarkable for the peculiar pale yellow color which all the fruit assumes before turning fully ripe and becoming dark purple; pit, small, 8-16 of an inch long by 5-16 of an inch in thickness; straight and sharp-pointed. The pulp seems to part with the bitterness slowly; but when extracted, the flavor is very rich. Ripens late—later than the broad-leaved Mission.

*Nevadillo Blanco*.—Imported by F. Pohndorf from Spain. Oval, slightly oblique, pointed, 1 inch long by 10-16 of an inch thick; resembling somewhat a broad-leaved Mission, but is generally more elongated in proportion to its diameter than the latter. Pit, small, curved and generally pointed at both ends; 10-16 of an inch long by 4-16 of an inch thick. The fruit

is borne in clusters of three to five. Its time of ripening does not appear to be much earlier than the broad-leaved Mission.

This variety has been propagated considerably at the nursery of the Experimental Station, and has been scattered widely by distribution from here during the last two or three years. The reports received from these trees go to show that it is a remarkably robust and fast grower in the hottest as well as in the coolest portion of the State. Should this olive prove a good and constant bearer, as there is every reason to believe, it will prove a valuable addition to our varieties of olives. Its time of ripening may be an objection to its planting in localities near the coast, subject to early frosts. Reports indicate that it is more tender to frost than certain other varieties—a fact which is undoubtedly due to its almost constant growth, and shows that moist soil should be avoided for this variety perhaps more than for any other.

*Manzanillo No. 2*.—Imported by F. Pohndorf from Spain. As the name ("small apple") indicates, this variety is of an unusual shape, only one—the Dalmatian (*Hervaza*) resembling it. It is nearly round, with a pit of rounded oval shape, rather squarely cut off at the base. As the specimens were few and not quite fully grown, measurements are not given. This variety ripens early—several weeks earlier than the broad-leaved Mission olive; the fruit grows generally singly on long stems.

This variety, which I have seen fruiting in Fancher Creek Nursery near Fresno, has the same straggling and sparse growth which characterizes the variety I have designated as *Manzanillo No. 1*. It is supposed to be this variety (No. 2) which has been disseminated from the Station, although, as Mr. Gallegos has received the other variety (No. 1) from the same source as we, under the name of *Manzanillo*, the two may have been mixed, the wood and foliage being much alike.

*Pendulina*.—Imported by John Rock from France. This variety is of an even oval shape, rounded at both ends, quite variable in size, many fruits remaining small and undeveloped; 12-16 of an inch long and 9-16 of an inch thick; pit, 7-16 of an inch long and 4-16 of an inch thick, exclusive of the small, sharp points often found at both ends. The fruit grows in clusters of from two to five; the pulp parts very readily with its bitterness. This variety must not be confounded with the *Pendoulier*—a variety imported by Mr. Albert Montpellier and fruited at his place at Vacaville. The latter variety is somewhat larger and more of an ovate shape.

*Oblonga*.—Imported by John Rock from France. An olive of a peculiar club-like shape, being narrow at the stem end, broad at the point, rounded and strongly oblique, 15-16 of an inch long and 8-16 of an inch in thickness; pit, curved, 11-16 of an inch long by 4-16 of an inch in thickness; generally pointed at both ends. The pulp loses its bitterness comparatively quickly in pickling. This olive ripens quite early—at least two to three weeks earlier than the broad-leaved Mission; color, dark purple.

Countance, as well as several other authors on the olive, gives the name of the Picholine as synonymous of *Oblonga*. As a matter of fact, the olive imported by Mr. Rock under the name of *Oblonga* is a totally different-looking olive from the variety described and pictured in the Annals of the School of Montpellier



(and translated in Mr. Lelong's pamphlet on olive varieties) as the Picholine. Rock's *Oblonga* seems to me to belong in the neighborhood of the *Lucques*.

*Common or Broad-leaved Mission Olive*.—The variety of olive most generally known as the Mission; 13-16 of an inch long by 10-16 of an inch thick; ovate, oblique—sometimes very much so. The pit straight or slightly curved, 10-16 of an inch long and 5-16 of an inch thick; fruit very variable in size, growing singly or in clusters of two or three or even five. Time of ripening, late in the coast region; sometimes not before February, but generally in December. In warmer localities, in November.

*Rubra, or Caillon*.—Imported by John Rock from France; ovate, slightly oblique, looks a good deal like a small Mission olive, 12-16 of an inch long and 8-16 of an inch thick; pit straight, pointed, 8-16 of an inch long and 4-16 of an inch thick. This variety is an early one, and ripened 3 to 4 weeks earlier than the common Mission variety; is of a jet black when ripe. This variety, it appears, has been imported by several different persons; among others Mr. Bliss of Riverside, on whose place I saw trees of it three years ago, heavily laden with fruit.

*Uvaria*.—Imported by John Rock from France. Oval, regular, and rounded on both ends; 13-16 of an inch long and 9-16 of an inch in thickness; pit straight, heavy, 10-16 of an inch in length and 6-16 of an inch in thickness. Late; later than the common Mission olive. Color, dark purple or black when ripe. The name, "grape-like," is well chosen; the fruit growing in clusters, as many as seven together, and in shape themselves resembling the grape.

*"Redding Picholine"*.—Imported by the late B. B. Redding. A perfect oval in shape, 8-16 of an inch long and 6-16 of an inch thick; pit, 6-16 of an inch long by 4-16 of an inch thick. Ripens early; several weeks earlier than the common "Mission;" dark purple or black when ripe. In pickling, the pulp loses the bitterness quickly, the fruit being very pleasant. This variety has been propagated extensively in the State, and until fruiting, was supposed to be a large pickling variety; then, not having an adequate description of the Picholine at hand, it was believed for a number of years to be rightly named after all; various authors designating the Picholine as a small olive. Two years ago, in the annals of the School of Montpellier, France, there appeared a description of the Picholine as known there. Mr. B. M. Lelong had this promptly translated for his report, and deserves credit for having thus settled that the variety of Redding's introduction is not the French Picholine. The Redding Picholine, which name has naturally suggested itself for want of a better, has produced oil of good quality. In proportion of pulp to pit it is but slightly inferior to the Italian Mignolo or Gremignolo (judging from Caruso's description). The only record in regard to the yield of oil I have had occasion to examine into, was made several years ago by Mr. L. A. Gould, then of Auburn, who, from 2500 pounds of olives, chiefly Picholine, only obtained 24 gallons of oil, making a percentage of 7.04. The Italian Mignolo in Caruso's work, measures only 9-16 of an inch, with a thickness of 7-16 of an inch; the pit being large, 8-16 of an inch long by 4-16 of an inch thick, which places it very near the

Redding Picholine. The strong recommendation of this olive by the Italian authorities, for foggy regions, makes this variety nevertheless interesting and worthy of trial in such places.

#### SERIES II.

Of these no measurements have been made, but some record of growth and general behavior is given in the preceding table.

*Atrorubens*.—Imported by J. Rock. According to Coutance synonymous with *Salierne* or *Sayerne*, of a violet black color, covered with bluish bloom, rounded at the base, pointed at the top. Cultivated throughout Languedoc; valuable for oil.

*Olea atroviolacea*.—Imported by J. Rock from France. A good-sized olive, making oil of first quality, according to soil.

*Razzo or Frantojano*.—Imported by Judge C. R. Logan of Santa Cruz. An olive from the Lucca district in Italy. Oval, medium size or below; it yields in its native country a very fine oil.

*Corregiolo, or Grossajo, or Frantojo*.—Imported by Judge J. R. Logan of Santa Cruz. An olive from the Lucca and Pisa district in Italy, furnishing some of the finest oil. Fruit medium-sized, of inverted oval (obovate) shape, narrow at the stem end, broader toward the point.

*Amellou or Olea amygdalina*.—Imported by Mr. C. A. Wetmore. A large, valuable variety, both for oil and pickles.

*Lucque or Olea adorata*, also imported by Mr. Wetmore. A peculiar almond-shaped olive; one of the richest for pickles.

*Mission Varieties*.—A number of years ago my attention was called to the fact that there existed several distinct forms or varieties of "Mission" olives. We are propagating now three apparently quite distinct kinds. *A. Broad-leaved* or common Mission (already described). *B. Narrow-leaved Mission*, a variety received originally from L. A. Gould of Auburn, described as having a somewhat larger fruit than the common Mission, and a more straggling habit. *C. Early Mission*, procured from A. A. Wheeler. It is of the Mission type, but ripens at the end of October in Alameda county. At Pomona, my attention was called to an old, large tree growing on the ground of Rev. Mr. Loop, which he stated bore a large olive, ripening in October. Whether the two are identical or not, I do not know.

*Oblitza*, obtained from Mr. Geo. Ladd of Atwater; imported by the late N. Milco from Dalmatia. This variety fruited at Atwater station, and resembles somewhat the variety called Pendoulier, specimens of which are fruiting at the ranch of A. Montpellier, near Vacaville. Further examination is necessary to determine whether the two are identical.

*Hervaza*, obtained from the same source as the above. This variety much resembles the *Manzanillo* in shape, but the pit of the fruit is more squarely cut off than that of the latter. The trees of the two varieties are totally distinct. The *Manzanillo* has an upright, sparse growth and dark-colored wood. The *Hervaza* is of drooping habit and the wood is light-colored. Time of ripening of the two falls about the same at Atwater; viz., in the beginning of October.

W. G. KLEE.

Berkeley, Feb. 15, 1890.